Electrostatics

DPP-4 Center for Engineering Studies

(Electric field & Potential.)

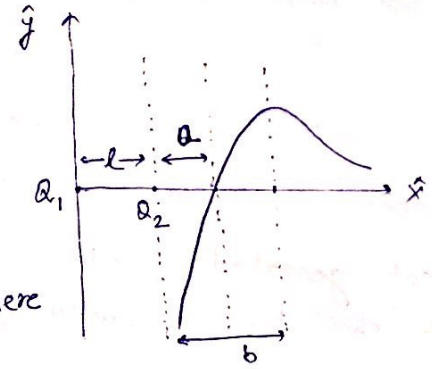
Q-1.

$|Q_2| = 2C$

$|Q_1| = 8C$

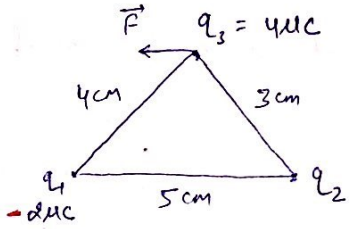
$\ell = 2m$

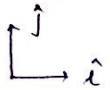
Find value of b where the field intensity is maximum ____ V/m




Two point charges $Q_1$ & $Q_2$ are positioned as shown below. The field intensity to the right of charge $Q_2$ on the line that passes through the two charges varies according to the law that is represented schematically in the fig. The field intensity is assumed to be positive if its direction coinside with positive direction on the x-axis.

Q-2.




Given that net force on charge $q_3$ is in negative x-direction The magnitude of force will be

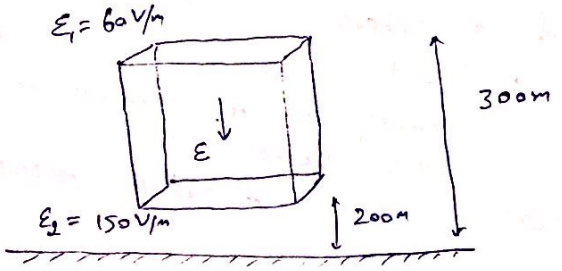
(a) 25.2 N (b) 32.2 N (c) 56.2 N (d) 13.5 N

Q-3. A flat square surface with sides of length 2 m is described by the equations $x = 2m$ ; $0 \le y \le 2$, $0 \le z \le 2$

Find electric flux through the squre due to a +ve point charge q located at origin (0,0,0)

(a) $\frac{q}{4\epsilon_0}$ (b) $\frac{q}{6\epsilon_0}$ (c) $\frac{q}{24\epsilon_0}$ (d) $\frac{q}{48\epsilon_0}$

Q-4. It has been experimentally observed that the electric field in a large region of earth's atmosphere is directed vertically down. At an altitude of 300m, electric field is 60 V/m. At an altitude of 200m the field is 150 V/m The net amount of charge contained in the cube of 100m edge, located between 200 m and 300 m altitude will be ____ $10^5\epsilon_0$ C

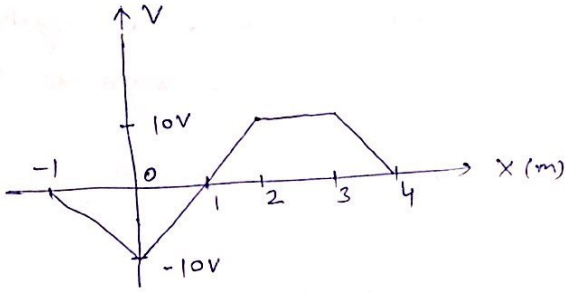


Q-5. A point charge $q = 2C$ is located on the axis of a disc of radius R m. at a distance 8 m from the plane of the disc. If one fourth of electric flux from the charge passes through the disc then $R = K(8)$ Value of $K =$ ——

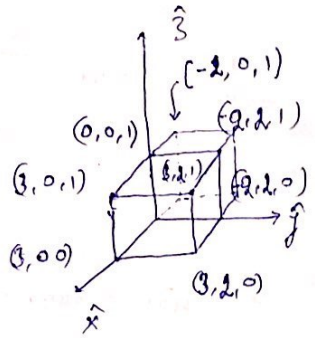
Q-6. A solid conducting sphere of radius 10 cm is enclosed by a thin metallic shell of radius 20cm. A charge $q = 20\,\mu C$ is given to inner sphere. Find the heat generated in the process when inner sphere is connected to the shell by a conducting wire

(a) 12 J (b) 9 J (c) 24 J (d) Zero.

Q-7. For a specific charge distribution the potential as a function of x is

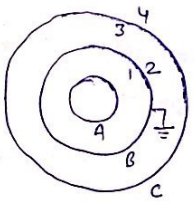



$\oint \vec{E} \cdot \vec{ds} =$ ——

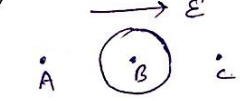



Q-8. Fig. shows three concentric thin spherical shells A, B and C of radii R, 2R and 3R. The shell B is earthed and A & C are given charges q and 2q respectively. If the charge appearing on surfaces 1, 2, 3 and 4 are $q_1$, $q_2$, $q_3$ & $q_4$ respectively then match the following

| Column-1 | Column-2 |
|---|---|
| 1. $q_1$ | A. $\frac{2}{3}q$ |
| 2. $q_2$ | B. $\frac{4}{3}q$ |
| 3. $q_3$ | C. $-\frac{4}{3}q$ |
| 4. $q_4$ | D. $-q$ |




Q-9. A dielectric in the form of a sphere is introduced into a homogeneous electric field. A, B and C are points as shown, Then




(a) Intensity at A increases while that at B and C decreases

(b) Intensity at A and B decreases whereas at C increases.

(c) Intensity at A & C increases and that at B decreases.

(d) Intensity at A, B and C decreases.